Claims ,

What is claimed is:

5   1.   A method comprising:

determining at least one cluster from an image comprising at least one segmented area;

estimating cluster parameters for the at least one cluster; and

10   evaluating the at least one cluster, whereby the step of evaluating is performed in order to determine whether to modify the at least one cluster.

2. .   The method of claim 1, wherein:

15   the step of estimating cluster parameters further comprises the step of estimating cluster parameters for each of the at least one clusters until at least one first convergence criterion is met; and

the step of evaluating cluster parameters further

20 comprises the steps of evaluating cluster parameters for each of the at least one clusters until at least one second convergence criterion is met, and performing the step of estimating if the at least one second convergence criterion is not met.

25 3.   The method of claim 1, wherein:

the step of estimating cluster parameters further comprises the steps of:

assigning pixels from a selected one of the segmented areas to one of the clusters, the step of assigning performed

30 until each pixel from a selected one of the segmented areas has been assigned to a cluster;

re-estimating cluster parameters for each of the clusters; and

determining if at least one convergence criterion is met.

4.   The method of claim 1, wherein the step of evaluating cluster parameters further comprises the steps of:

determining whether a selected cluster should be deleted;

deleting the selected cluster when it is determined that the selected cluster should be deleted.

5.   The method of claim 4, wherein the step of determining whether a selected cluster should be deleted comprises the steps of:

determining if the selected cluster encompasses a predetermined number of pixels from a segmented area; and

determining that the selected cluster should be deleted when the selected cluster does not encompasses the predetermined number of pixels from a segmented area.

6.   The method of claim 1, wherein the step of evaluating cluster parameters further comprises the steps of:

determining whether a selected cluster should be split;

splitting the selected cluster into at least two clusters when it is determined that the selected cluster should be split.

7.   The method of claim 6, wherein the step of determining whether a selected cluster should be split comprises the steps of:

determining how many first pixels from a segmented area are within a first region of the cluster;

determining how many second pixels from a segmented area are within a second region of the cluster; and

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determining that the selected cluster should be split when a ratio of the second pixels and the first pixels meets a predetermined number.

5   8.   The method of claim 1, wherein:

the step of determining further comprises the step of determining cluster parameters for a previous frame;

the step of evaluating clusters further comprises the steps of:

10   determining if a new cluster should be added by determining how many pixels in the image are not assigned to a cluster; and

adding the unassigned pixels to a new cluster when the number of pixels that are not assigned to a cluster meets a predetermined value.

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9.   The method of claim 1, wherein:

the step of determining further comprises the step of determining cluster parameters for a previous frame;

20   the step of evaluating clusters further comprises the steps of:

determining if a new cluster should be added by determining how many pixels in the image are not assigned to a cluster; and

25   performing a connected component algorithm on the unassigned pixels in order to add at least one new cluster.

10.   The method of claim 1, where in the step of evaluating

30   the at least one cluster comprises adding a new cluster, deleting a current cluster, or splitting a current cluster.

11.   The method of claim 1, wherein segmented areas are determined through background-foreground segmentation.

12.   The method of claim 11, wherein the background-foreground segmentation comprises background subtraction.

13.   The method of claim 11, wherein the segmented areas are marked, wherein the marking is performed through binary marking, whereby background pixels are marked one color and wherein foreground pixels are marked a different color.

14.   The method of claim 1, wherein:
        each of the clusters is an ellipse, θ_k;
        each pixel belonging to a segmented area is a foreground pixel; and
        the step of estimating cluster parameters comprises the steps of:
            assigning each foreground pixel, X, to each of the ellipses so that a probability that a pixel belongs to a selected ellipse, $P(X|\theta_k)$, is maximized; and
            estimating the parameters of each ellipse, θ_k, to fit the pixels assigned to a selected ellipse, θ_k, within a predetermined error.

15.   A system comprising:
        a memory that stores computer-readable code; and
        a processor operatively coupled to said memory, said processor configured to implement said computer-readable code, said computer-readable code configured to:
            determine at least one cluster from an image comprising at least one segmented area;

estimate cluster parameters for the at least one cluster; and

evaluate the at least one cluster, whereby the step of evaluating is performed in order to determine whether to modify

5   the at least one cluster.

16.   An article of manufacture comprising:

a computer-readable medium having computer readable code means embodied thereon, said computer-readable program code

10   means comprising:

a step to determine at least one cluster from an image comprising at least one segmented area;

a step to estimate cluster parameters for the at least one cluster; and

15   a step to evaluate the at least one cluster, whereby the step of evaluating is performed in order to determine whether to modify the at least one cluster.